CLAIMS:

1. A polymer, comprising:

5-vinyltetrazole monomer units; and

a molecular weight distribution less than 2.0

2. The polymer of claim 1, wherein the polymer is a block copolymer and the polymer comprises a block of 5-vinyltetrazole monomer units.

3. The polymer of claim 2, further comprising a block capable of selective separation of closely related chemical species such as ions, proteins or nucleic acids via ionic bonding or complex formation.

4. The polymer of claim 3, wherein the block capable of selective separation comprises at least one of dimethylacrylamide, butyl acrylate, dimethylaminoethyl methacrylate, diethyl acrylamide, and NIPAM.

5. The polymer of claim 4, wherein the polymer is used as a coating.

6. The polymer of claim 5, wherein the polymer phase separates into discrete nano-domains.

7. The polymer of claim 6, wherein the polymer a phase of the nano-domains comprises at least a portion of the 5-vinyltetrazole monomer units, and the 5-vinyltetrazole monomer units form complexes with a transition metal.

8. The polymer of claim 1, comprising at least two blocks comprising 5-vinyltetrazole monomer units.

9. The polymer of claim 1, wherein the polymer is at least one of a homopolymer, a random or statistical copolymer, a star block copolymer, a linear polymer, a branched polymer, a hyperbranched polymer, a dendritic polymer, a bottle-brush copolymer and a crosslinked structure.

10. The polymer of claim 1, wherein the polymer is tethered to a surface.

11. The polymer of claim 1, wherein the polymer is supported on a surface.

12. The polymer of claim 11 wherein partial coverage of the surface provides an array of functional segments.

13. The polymer of claim 11, wherein the polymer is support on one of an inorganic support and an organic support.

14. The polymer of claim 13, wherein the support is at least one of an ion exchange resin, a silica particle, and a poly(styrene) particle.

15. The polymer of claim 2, wherein the polymer is one of a star block copolymer, a linear polymer, a branched polymer, a hyperbranched polymer, a dendritic polymer, a bottle-brush copolymer and a crosslinked structure.

16. The polymer of claim 13, wherein at least a portion of the monomers are radically copolymerizable monomers.

17. The copolymer of claim 3, wherein at least a portion of the monomers are radically copolymerizable monomers.

18. A process, comprising:

reacting a first polymer comprising at least one nitrile group with an azide to form a polymer comprising at least one tetrazole ring, wherein the first polymer has molecular weight distribution of less than 2.0.

19. The process of claim 18, wherein first polymer is at least on of a homopolymer, a copolymer, a random copolymer, statistical copolymer, linear block copolymer, star block copolymer, a graft copolymer, a brush copolymer, and a polymer attached to a particle surface

20. The process of claim 18, wherein reacting a first polymer comprising at least one nitrile group with an azide comprises reacting the first polymer with sodium azide and zinc chloride and wherein the molar ratio of sodium azide to nitrile groups and the molar ratio of zinc chloride to nitrile groups are both individually greater than 1.5.

21. A process for the preparation of polymers, comprising:

conducting a click chemistry reaction on a functional group attached to a functional polymer, wherein the polymer has a molecular weight distribution of less than 2.0.

22. The process of claim 21, further comprising:

reacting a terminal group on a first polymer with a compound to form a polymer comprising groups capable of reacting in a click chemistry reaction; and

wherein conducting a click chemistry reaction results in chain extending the functional polymers to form a higher molecular weight polymer.

23. The process of claim 22, wherein the click chemistry reaction results in the formation of linear polymers with distributed functionality.

24. The process of claim 23, wherein the distributed functionality comprises a degradable functionality.

25. The process of claim 23, wherein the linear polymer is a block copolymer comprising two or more segments of different composition.

26. The process of claim 22, wherein the click chemistry reaction results in the formation of graft copolymer.

27. The process of claim 22, wherein the click chemistry reaction results in the formation of a graft copolymer tethered to a polymer, particle or a substrate.

28. The process of claim 22, further comprising preparing the first polymer by a controlled radical polymerization process.

29. The process of claim 22, wherein terminal groups comprise an acetylene bond or an azido-group.

30. The process of claim 22, wherein the functional group attached to a functional polymer is a nitrile group and conducting a click chemistry reaction on a nitrile group results in formation of a azole functionality.

31. The process of claim 21, wherein the functional group attached to a functional polymer is one of an azido group, acetylenic amino group, and phosphino group.

32. The process of claim 21, wherein the click chemistry reaction comprises a dipolar cycloaddition reaction with triple bonded functional groups.

33. The process of claim 21, wherein the triple bonded functional groups comprise alkynes and nitriles and result in the formation of substituted triazoles or tetrazoles.

34. The process of claim 21, wherein conducting the click chemistry reaction results in the addition of a functional group selected from amino, primary amino, hydroxyl, sulfonate, benzotriazole, bromide, chloride, chloroformate, trimethylsilane, phosphonium bromide or bio-responsive functional group including polypeptides, proteins and nucleic acids to the polymer.

35. The process of claim 21, further comprising:

reacting a terminal group on a first polymer with a compound to form a polymer comprising groups capable of reacting in a click chemistry reaction. wherein the polymer has a molecular weight distribution of less than 2.0; and

conducting a click chemistry reaction resulting in a ring closing reaction to form a macrocyclic polymer.